The consideration of electrical conductivity measurements of aqueous solutions of HCl, RbCl, CsCl, KBr, and KI suggests that there may be hydrated ions in association with unhydrated ions, and that the unhydrated state may characterize either the positively-charged or the negatively-charged component.

It will now be of interest to note that a similar examination of the relative specific molecular conductivities of the electrolytes cadmium bromide, $CdBr_2$, and cadmium iodide, CdI_2, leads to the conclusion that in aqueous solutions of these salts all ions are hydrated. Yet we have heretofore noted that in association with potassium as KBr and KI the ions Br^- and I^- were indicated as not hydrated. Under the circumstances it appears that the presence or absence of the hydration of the Br^- and I^- ions may be a matter of association. Since by the precepts of the present inquiry hydration conditions the velocity of an ion it follows that we have come into variance with the Kohlrausch Law of the Independent Migration of Solute Ions, which holds velocity as independent of association.

In connection with the consideration of the hydration characteristics of inorganic and organic molecular ions in subsequent papers of this series it will be of interest to note from time to time further evidence that association may condition the presence or absence of hydration. Within the limits of a specified state, hydrated or unhydrated, the Law of Kohlrausch has been shown in this and in the foregoing papers to be applicable in substantial measure to concentrated solutions. Yet with the accession of additional evidence that the two states, hydrated and unhydrated, may characterize the ions of the same elements in different electrolytes, it would appear that the law would fail as a correct description of velocity relationships.

CHEMISTRY.—*Lignin-like complexes in fungi.*[1] CHARLES THOM and MAX PHILLIPS, Bureau of Chemistry and Soils.

Recent papers dealing with the decomposition of plant residues (Waksman and associates)[2] point to the lignins as decomposing more slowly than other plant constituents, hence as tending to accumulate as a result of the rotting of plant materials. The abundance of these lignin-like complexes in soil organic matter is noted as confirmatory evidence. The accumulation of the remains of soil microörganisms is also indicated as one source of these slowly decomposing substances.

[1] Received April 1, 1932.

[2] Summarized with bibliographic notes by Waksman, S. A. *Principles of Soil Microbiology.* Ed. 2. Chapter 24. 1932.

Additional information as to lignin-supplying organisms becomes therefore of interest.

Every field student of the fungi is familiar with the abundance of black and brown (dematiaceous) species upon the surfaces of decaying vegetation. They give a dirty black brown color to plant remains in the field and the fence corner during the moist portions of the year. Many of them are less familiar with the fact that these organisms predominate only in the presence of air and light. They are not commonly found actively vegetating entirely below the surface of the soil. In connection with our studies of decaying crop residues, certain analyses have been made in the Bureau of Chemistry and Soils, which may be worthy of record.

Four of these species common on the soil and on decomposing plant remains, were grown upon Czapek's solution which presents sucrose as the only source of carbon. These were incubated until thick masses of dark mycelium were developed. The cultures were then filtered through sintered glass Jena crucibles, washed with water, dried at 105°C. The dry material was extracted with a 1:1 alcohol-benzene solution, dried and analyzed for lignin by the fuming hydrochloric acid method (J. Assoc. Off. Agric. Chemists **15**; 124. 1932). The percentage of lignin was calculated on the oven-dry (105°C.) material.

The results of the analyses have been tabulated as follows:

Species	Per cent Lignin
(1) *Alternaria* sp	17.25
(2) *Epicoccum* sp	20.30
(3) *Sclerotinia libertiana* (with sclerotia present)	7.85
(4) *Cladosporium* sp	29.27

The amount of lignin found was sufficiently striking to suggest the analysis of certain bracket fungi.

Species	Per cent Lignin
Hydnum caput-ursi (pure white)	2.65
Polyporus sulphureus (sulphur yellow)	3.40
Trametes pini (deep brown)	54.08
Fomes igniarius (almost black)	36.95

There is a marked contrast between the pure white *Hydnum* and the sulphur yellow *Polyporus* on the one side and the deep brown *Trametes* and almost black *Fomes*, on the other. Confirmatory analyses of other cultures and samples support the view that the dark brown, leathery, black and carbonaceous masses produced by whole groups of fungi are high in organic complexes of a lignin-like character, whereas the colorless or light colored fungi have little lignin-supplying power.

A possible relationship to soil organic matter might be suggested by the predominance of black and brown molds on vegetation decaying at and just above the surface of the soil as such decomposition occurs under natural or so-called "virgin" soil conditions. Brown and black forms produce very little growth in material plowed under, hence play little part where clean cultivation involves covering all crop residues with several inches of earth.

CONCLUSION

In the analyses reported (a), the brown walled molds such as *Cladosporium* and *Alternaria* contain high percentages of lignin-like substances (such as 17.25 to 29.27% in dry matter) upon culture media presenting sucrose as a sole source of carbon. (b) Brown walled bracket fungi such as *Trametes pini* and *Fomes igniarius* contain even higher percentages of these "lignins." (c) The light colored bracket fungi showed correspondingly little lignin-like substance.

PALEONTOLOGY.—*New species of fossil Raninidae from Oregon.*[1]

MARY J. RATHBUN, U. S. National Museum.

From time to time Dr. Hubert G. Schenck of Stanford University has given to the National Museum various crustaceans from the Tertiary of Oregon. Among them are four new Raninidae which are here described and will be incorporated in Schenck's report on the region.

Raninoides oregonensis, new species

Seemingly related to *R. eugenensis* Rathbun[2] from the Oligocene of Lane County. Anterior portion of carapace lacking. Carapace broadest at anterior $\frac{2}{3}$, broader than in *eugenensis*, but like that species, convex from side to side and sloping gradually downward on the median line from the anterior to the posterior end. Surface covered with minute granules not visible to the naked eye and with the tips rubbed off, appearing like punctae. A lateral spine near anterior fifth and directed obliquely forward is broken off near base. Length (estimated) 38, greatest width behind spines 32, posterior width 16 mm.

Type-locality.—Near Dallas, Polk County, Oregon; limestone formation, Eocene. Cat. No. 371922, U. S. N. M.

Lyreidus alseanus, new species

The specimen, encased in a nodule, was originally longer and flatter than at present. The carapace is cracked across the widest part and again across

[1] Published with the permission of the Secretary of the Smithsonian Institution. Received February 25, 1932.

[2] Bull. 138, U. S. Nat. Mus., 1926, p. 96, pl. 24, fig. 4.

the front half, the broken edges overlapping each other and at the middle pushed upward. There is also a longitudinal break at the left of the median line. Front narrow, widening a little at extremity; at the left 2 rounded lobes separated by a subrectangular sinus and succeeded by a rounded sinus,

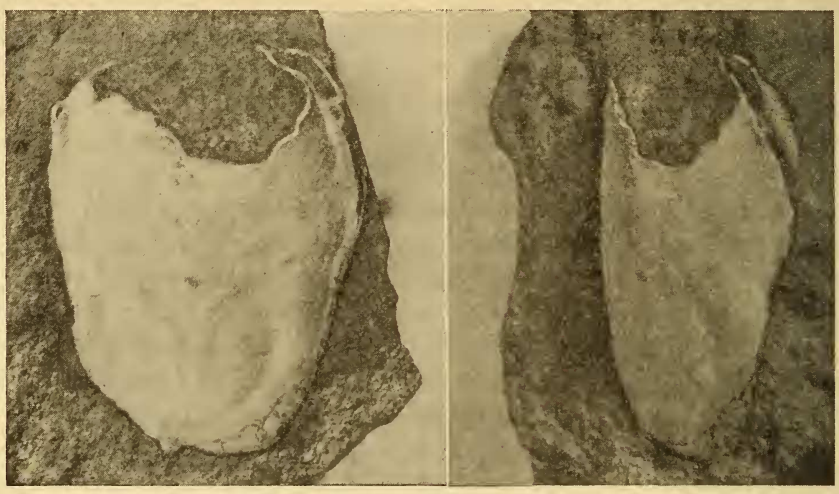

Fig. 1. (Left) *Raninoides oregonensis*. Dorsal view of carapace of holotype, showing lateral spine, x 1-1/2.

Fig. 2. (Right) *Raninoides oregonensis*. Same specimen from the right side, showing part of lower surface, x 1-1/2.

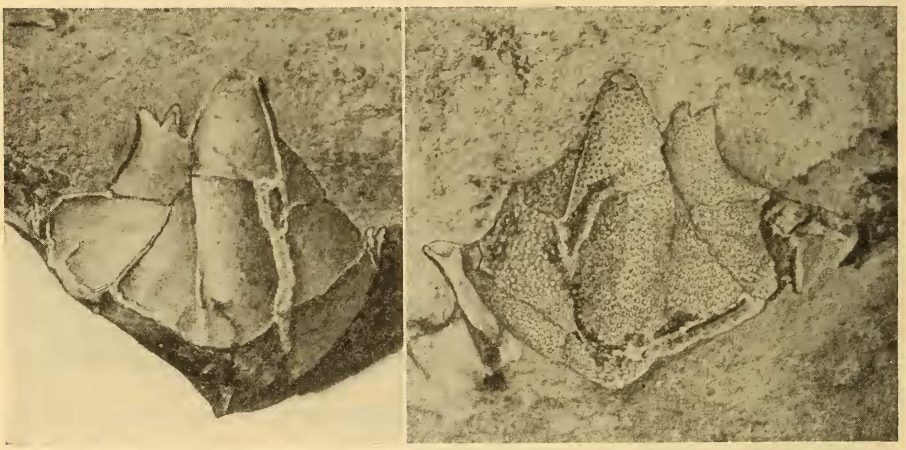

Fig. 3. (Left) *Lyreidus alseanus*. Dorsal view of an inner layer of carapace of holotype, cracked and out of shape, x nearly 2.

Fig. 4. (Right) *Lyreidus alseanus*. Lower side of upper layer of carapace of same specimen, x nearly 2.

all of which occupy half or nearly half the front. Carapace widening rapidly from rostrum to lateral angle, in front of which on the right side there is a small knoblike tooth, longer than broad, curving forward and away from the antero-lateral margin; just outside this tooth is the impression of another.